195
17 20
34

Br 22484
1899

Fig 1

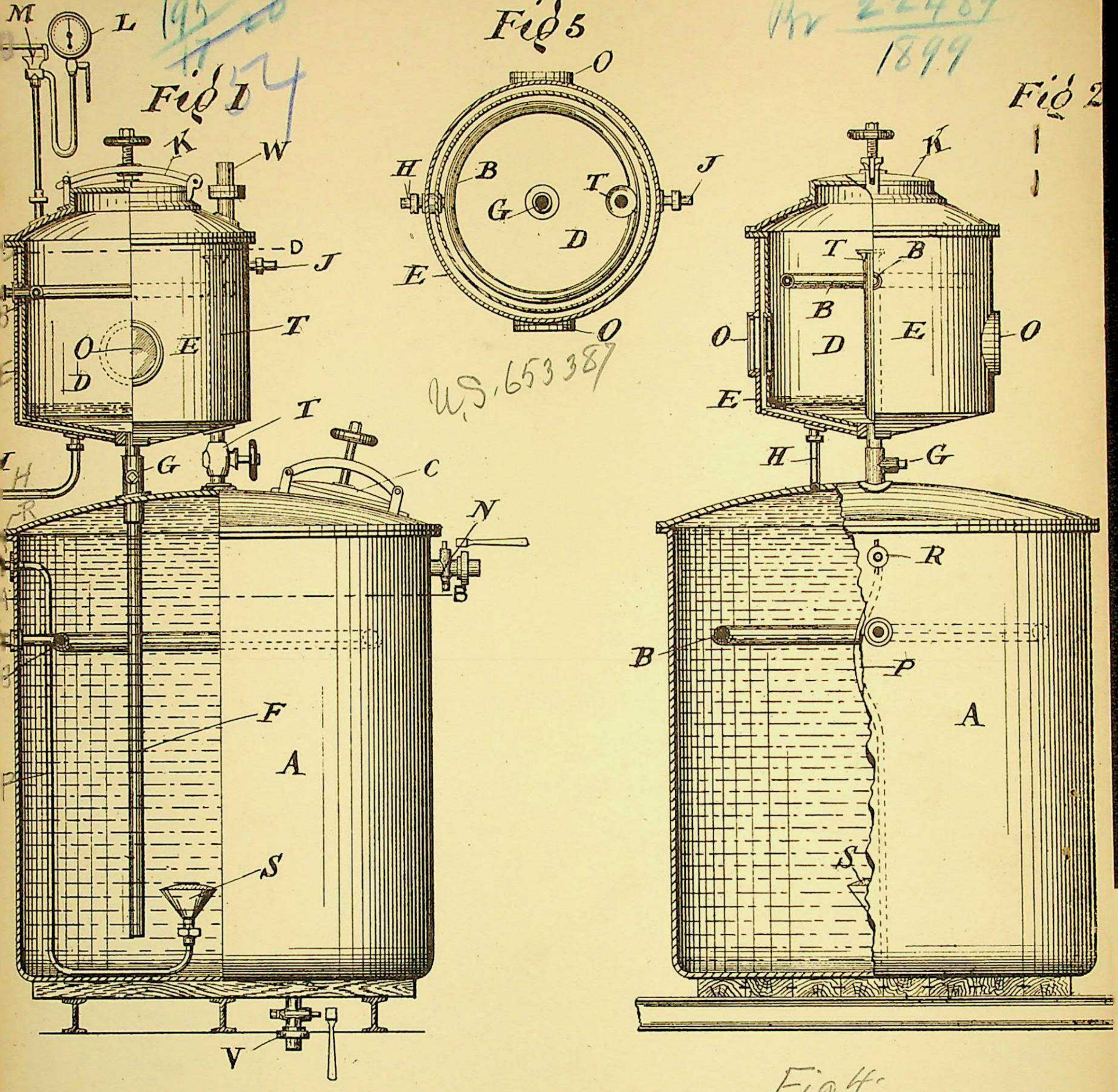


Fig 5

U.S. 653387

Fig 2

Fig 3

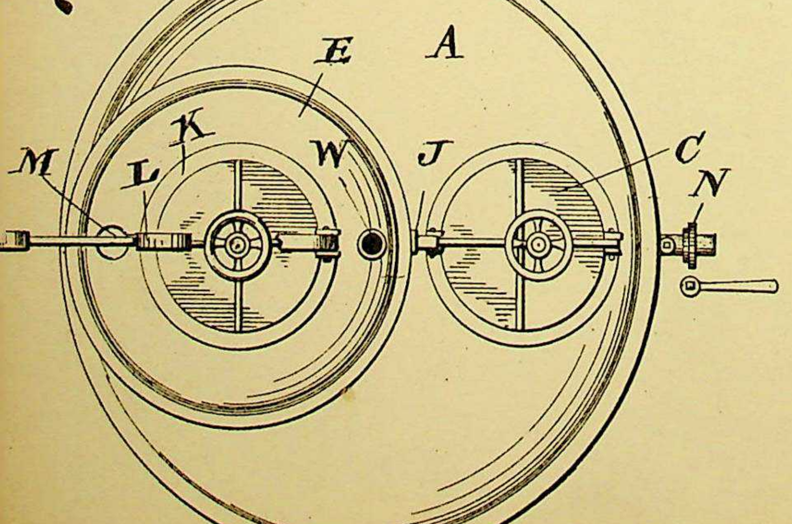
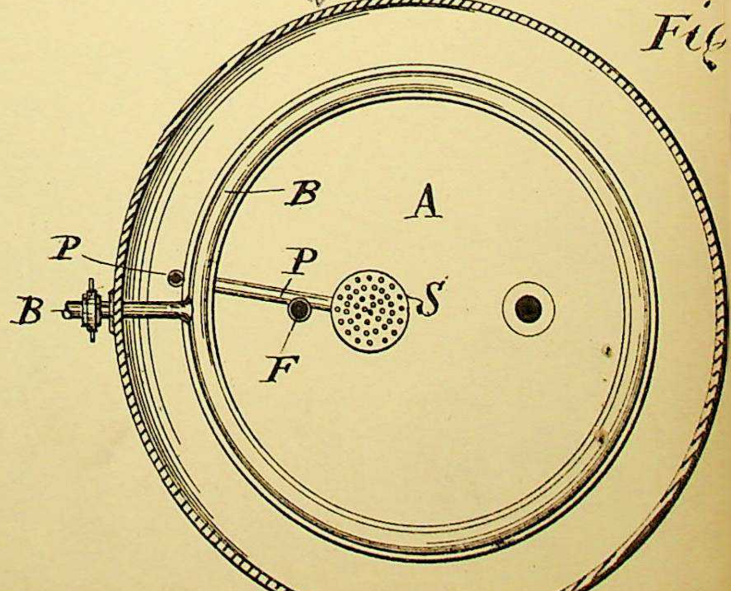


Fig 4.



426/16 ERAGES
39 Cl 99 1899 ①
Fermenting app 37
D.
54
RECORDED
DUPLICATE

N° 22,484 A.D. 1899

Date of Application, 10th Nov., 1899—Accepted, 16th Dec., 1899

COMPLETE SPECIFICATION.

A New or Improved Process and Apparatus for the Fermentation of Beer.

We, Anthony Duncan Williamson King, of 42, Charleville Road, Kensington, London, W., Brewer, and James Henry Howell, of 104, Pembroke Road, Clifton, Bristol, in the County of Gloucestershire, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Our invention relates to a new or improved process and apparatus for the fermentation of beer, after the manner known as "top fermentation," and has for its objects. Firstly; cleanliness, and the entire exclusion of atmospheric air and the impurities that therein dwell during the process. Secondly; to provide a means for collecting the carbonic acid gas generated during fermentation, and Thirdly; to provide a means for collecting and storing under cover the yeast brought into existence during the said process.

In order that our said invention and the manner in which we purpose carrying the same into effect, and the general construction and arrangement of our improved apparatus employed in the said process may be fully and clearly understood, we have hereunto appended a sheet of drawings, of which:

Fig. 1 is an elevation, partly in section of the fermenting apparatus.

Fig. 2 is a like elevation taken at right angles to Fig. 1.

Fig. 3 is a plan or top view of same.

Fig. 4 is a section taken upon a line A B Fig. 1, while Fig. 5 is a section taken upon the line C D of the latter figure.

In fermenting beer it is usual to convey the wort from the copper onto or into a refrigerator for reducing the temperature of the wort prior to fermentation, and in the present methods in use such refrigerating or cooling of the wort is carried out in the open air, but the salient feature of our invention is that the said wort shall not come in contact with the atmosphere from the time it leaves the copper until it has passed through the fermenting stage and becomes finished beer and placed in the cask ready for consumption, and indeed it may be so arranged that the beer does not come into contact with atmospheric air until drawn from the cask by the consumer.

For the purposes of our invention we therefore employ any form of enclosed refrigerator, by means of which the wort may be conveyed, by a suitable closed conduit, direct from the boiling copper into the said refrigerator, and from the said refrigerator, through a suitable closed conduit, direct to our improved fermenting apparatus as hereinafter explained, without coming into contact with the atmospheric air.

Our improved fermenting apparatus consists of a preferably cylindrical air tight vessel A (hereinafter referred to as the fermenting chamber) which may be of any dimensions according to the extent of the brew, and may be made of metal, slate, glass or other material or combination of materials, and provided with an attemporator B for the flow of iced water in the usual way, and a man-hole or

[*Price* 8*d*.]

inspection cover C. Upon the preferably domed top of the fermenting chamber is mounted and fixed, an air tight vessel D (hereinafter referred to as the yeast vessel) which may be of metal, slate or other suitable material, the side-wall and bottom of which are encased by a jacket E, the said yeast vessel being in communication with the fermenting chamber by the means of a tubular passage F, the upper end of which is flush or thereabouts with the bottom of D, and extends into, and to within a short distance of, the bottom of A, the portion between D and A, being provided with a cock or tap G. The jacket E of the yeast vessel D is for the passage of a constant flow of iced water, which for preference we arrange to enter at a point H (cock governed or otherwise) and exhaust at a point J or *vice versa* as may be found most convenient. The said yeast vessel is also provided with an attemporator B for the passage of a flow of iced water, a man-hole or inspection cover K, pressure gauge L, and safety valve M.

For the most advantageous working of our improved system of top fermentation, we conduct the wort (coming as before stated through a closed conduit from the closed refrigerator) so that this enters the fermenting chamber A through a cock governed passage N, and such flow of cooled wort would continue until the chamber A had become quite full, and the wort by passing up through the tube F had risen in the yeast chamber D to a height of 6 or 7 inches or thereabouts, or to such an extent as would be capable of replacing the loss of fullness of wort in A occasioned by the accumulation of yeast during fermentation, it being an essential condition, according to our invention, that the chamber A is always full during the fermentation process, and in order that the attendant may know when the wort has risen the desired height in the yeast chamber, the latter may be provided with one or more sight glasses O for this purpose, and when the wort is thereby seen to have attained the desired level in D, the attendant would close the cock N and so shut off the supply of wort.

A certain amount of pure yeast having been placed in the fermenting chamber A and now added to the wort therein an incipient form of fermentation would now commence, and as we make an important feature of our invention that the fermentation process be carried out without exposure to the atmosphere in order to exclude possible infection therefrom, the air necessary for perfect fermentation we provide by forcing pure filtered sterilized air into the chamber A, by the means of a pipe P, entering at R, and exhausting through a rosette or other screening surface S, into the wort, and upon the rapid fermentation following such entry of sterilized filtered air the head of yeast consequent upon such fermentation would, as formed, rise up in the wort and flow up through a cock governed passage T, extending high up into the yeast vessel D, and such upward flow of yeast would fall from T into D, and such generation and rise of yeast would naturally lower the level of the wort in D as this flows down through the tube F into A to replace that removed by the generation of the yeast, hence the object of the wort being allowed to rise into D in the first instance, and this action would set up a circulation in the wort which would continue until the time arrived for clearing the beer, when the cock G of the pipe F would be closed, the yeast still continuing to rise into the tube T and fall over into the vessel D until fermentation ceases, when the cock of the passage T would be closed and the yeast in D be allowed to remain until needed for further use.

The pure beer now in the chamber A may be drawn off through a tap V, and for the purposes of our invention the said beer may pass from V, by the means of an air tight conduit, direct to the casks, or to an intermediate filter as may be found most convenient, the pressure of carbonic acid gas (CO_2) in the vessel A and chamber D, generated during the fermentation process, serving to force the beer through the said air tight conduit to the said filter or casks, and such of the carbonic acid gas generated as may be in excess of that needed for the purposes stated may be drawn off through an outlet W and be stored where convenient for future use in the next operation.

From the foregoing it will be understood that by reason (according to our invention) of the hot wort being conveyed directly from the copper into an enclosed air-tight refrigerator, the steam would operate to shield the liquor from atmospheric influence, and that by reason of the cooled wort passing from the enclosed refrigerator through a closed conduit to the fermenting chamber A, and from this, when converted into pure beer, by the means of an enclosed conduit, to the casks or elsewhere, that the whole process is carried out without the wort or beer at any one time coming in contact with the atmosphere, and further that the yeast as formed being collected and stored without contact with the atmosphere may be kept for an almost indefinite period, while the carbonic acid gas generated may be drawn off and stored for future use, instead of wasted as hitherto, hence the attainment of the objects of our invention.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1st. The herein described process of cooling, and apparatus for the top fermentating of beer, and storing the pure yeast produced, and collecting and storing the carbonic acid gas (CO_2) generated during such fermentation, substantially as and for the purposes set forth and shewn.

2nd. The herein described process of cooling, and apparatus for the top fermentation of beer, in which the wort is conveyed by an air tight conduit directly from the copper to an inclosed air tight refrigerator, and from such refrigerator by an air tight conduit to an air tight fermenting chamber, in air tight connection with an air tight yeast collecting vessel, in combination with the use of sterilized filtered air, and means for collecting and storing the carbonic acid gas generated during the fermenting process, substantially as herein described and shewn by the accompanying drawings.

3rd. In an improved process and apparatus for the top fermentation of beer, and in combination with an enclosed air-tight refrigerator, the combination of an air tight conduit from the copper to the said refrigerator, and an air tight conduit from the said refrigerator to a fermenting chamber such as A, the said chamber being provided with an attemporator B, and a sterilized filtered-air conduit P, and manhole or inspection cover C, and having mounted thereon and connected thereto a jacketted vessel D E, having an attemporator B, manhole or inspection chamber K, safety valve L, and gauge glass M, communication between the chamber A and vessel D being made by the means of a cock governed tube or passage F for conveying the wort, and by a cock governed passage T for conveying the yeast and carbonic acid gas, with means such as an outlet W for collecting and storing such carbonic acid gas, and means such as a cock governed outlet V in connection with the chamber A for removing the beer after fermentation, substantially as herein described and shewn by the appended drawings.

Dated this 10th day of November 1899.

GEO. THOS. HYDE,
1, Broad Street Buildings, Liverpool Street, London, E.C.,
Agent for the Applicants.

Redhill: Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.—1899.